Appl. No. 10/828,846
Amdt. dated October 2, 2006
Reply to Office Action of March 31, 2006

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REMARKS/ARGUMENTS

Claims 1-31 were pending. Claims 1, 6, 18 and 24 have been amended.
Therefore, upon entry of this amendment, which is respectfully requested, claims 1-31 will
remain pending.

Disclosure of the Invention

The present disclosure teaches a system for identifying whether the antibody
profile of a patient test sample corresponds with particular SADs from a set of SADs sought to
be investigated for the patient. The training set with which a test sample is compared includes
data associated with the SADs sought to be investigated for a particular patient or patients. The
training set is made up of reference samples that have disease conditions that are known as well
as samples that are known to be disease free ("none"). Each reference sample may therefore
associated with, none, one or more of the systemic autoimmune diseases. When the test data set
is statistically compared with the training data set using a nearest neighbor process, or algorithm,
such as a k-nearest neighbor (KNN) process, or algorithm, a determination of one or more
particular diseases may be achieved. The KNN algorithm processes the training data sets and
test data set as data points in an N-dimensional space, where N is the number of test values (e.g.,
antibody test levels) obtained for each sample. The disease(s) associated with the k nearest data
points (from the training sets) that are closest (e.g., based on a numeric distance metric) to the
test data point are then identified as a disease which is present in the patient sample from which
the test data point is derived. If the k nearest data points are associated with more than one
disease, an indication for each of the diseases may be provided or output. If the k nearest data
points are associated with none of the diseases (e.g., if many or all of the k nearest test data
points were derived from samples from subjects known to be disease free), then the indication
could be "none".

Rejections

Claims 1-5, 8-12, 14-21 and 25-31 have been rejected under 35 USC §101 as
being drawn to non-statutory subject matter. In particular, it was alleged that claims 1-5, 8-12
and 14-17 are directed to a computer-implemented process that does not recite either a physical

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transformation of matter nor a practical application. Also, it was alleged that claims 18-21 and 25-31 are directed to a computer system configured to provide output data, but is not limited to comprise any hardware element or combination of software and hardware such that it is interpreted to be a physical article of manufacture.

Claim 1 has been amended to recite "providing the statistically derived decision as output." It is respectfully asserted that claim 1 recites a concrete, tangible and useful result, as providing the decision as output, for example, provides useful information (the statistically derived decision) to assist with making a diagnosis. For example, as further recited in dependent claims 6 and 7, the output may be a display output for rendering on a display screen.

Claim 18 has been amended, in part, to recite "a memory module" instead of "storage means", and "a processor" in place of "a means for processing". It is believed that claim 18 recites limitations of a physical article of manufacture.

Claims 18-21 and 25-31 have been rejected under 35 USC § 112, first paragraph, as failing to comply with the written description requirement. In view of the amendments to claim 18, particularly the amendment replacing "storage means" with "a memory module," it is believed that this rejection is moot.

Claims 1-31 have been rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In particular, claims 1 and 18 recite the limitation of "having an association," which is alleged to be unclear. Claims 1 and 18 have been amended, in part, to recite "wherein said reference data sets include, for each of said plurality of specific SADs, at least one reference data set for the specific SAD" so as to remove "having an association with" from the claims, yet maintain the concept that the reference data sets include at least one data set for each SAD in the plurality of SADs. It is respectfully asserted that "associated" language is clear with respect to the at least one reference data set associated with none of the specific SADs recited in the claims.

Also, claim 9 recites the limitation of "wherein storing includes receiving", which was indicated to be confusing. The recitation of "storing" in claim 9 refers to the limitation of "storing" in claim 1, upon which claim 9 ultimately depends. Therefore, it is asserted that this

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limitation is not confusing. Said another way, claim 8 further limits the "receiving" step of claim 1, and claim 9, although dependent on claim 8 (which itself depends from claim 1), further limits the "storing" step of claim 1. Also, reference data sets are received in claim 9 and the sample data set is received in claim 8.

Claim 18 recites the limitation of a "storage means", but it is alleged that no storage means has been specifically described. In view of the amendments to claim 18, particularly the amendment replacing "storage means" with "a memory module," it is believed that this rejection is moot.

Claims 1-5, 11-14, 18-21 and 25-28 have been rejected under 35 USC § 103(a) as being made obvious by Thompson et al. (Lupus, 1993, 2, p. 15-19), in view of Kim et al. (IEEE Transactions on Pattern Analysis and Machine Intelligence, 1986, p. 761-765) and Diamond et al. (Cytometry, 1994, 17, p. 266-273).

Claims 6-10 and 22-24 have been rejected under 35 USC §103(a) as being obvious by Thompson et al. (Lupus, 1993, 2, p. 15-19), in view of Kim et al. (IEEE Transactions on Pattern Analysis and Machine Intelligence, 1986, p. 761-765) and Diamond et al. as applied to claims 1-5 and 11-14, above, and further in view of Kopecky (Design and Implementation of the Internet-Based Medical Expert System ToxoNet, 1999, p. 1-153).

It is respectfully asserted that Thompson fails to teach or suggest the limitations of claims 1 and 18 as is alleged in the Office Action. In particular, Thompson fails to teach or suggest the limitation of storing a plurality of reference data sets in a memory, "each reference data set having values representing levels for each of a plurality of specific autoantibodies, wherein said reference data sets include, <u>for each of said plurality of specific SADs</u>, at least one reference data set for the specific SAD, and wherein said reference data sets include at least one reference data set associated with none of the specific SADs;" as is recited in claims 1 and 18 (emphasis added).

Rather, Thompson teaches correlating antibody profiles with a single disease. For example, Table I in Thompson lists antibody profile types for a single disease, namely SLE variants. Further, Thompson explicitly states at page 15 that the study was "undertaken to determine what, if any, were the clinical correlates in patients with SLE segregated according to

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their antibody profile." Thompson is therefore specifically directed to determining correlation between antibody profiles of patients having a single disease, only SLE, and does not teach or suggest the concept of correlating the antibody profile of a patient sample with antibody profiles corresponding to plurality of different diseases for the purpose of distinguishing the disease(s) associated with the patient sample. Also, nowhere does Thompson teach or suggest the concept of distinguishing patients with disease from patients without disease based on their antibody patterns. Further, nowhere does Thompson teach or suggest producing a statistically derived decision indicating whether a patient test sample is associated with none, one or more of said (plurality of) specific SADs as is recited in the claims.

The presently claimed invention, to the contrary, distinguishes one autoimmune disease from another, such as SLE and Scleroderma, when appropriate. The presently claimed invention also identifies situations where there is more than one possible disease that fits the antibody pattern. This is important because many patients do in fact fit the definition of more than one disease or have what is called overlap syndrome, which is a condition where there are symptoms consistent with more than one disease.

Moreover, although the word "pattern" may be used in Thompson, this does not correspond to "pattern recognition" because the authors pre-define the patterns; they only use available knowledge to produce these classes and are limited in this way to what is known. For example, the authors of Thompson state (see Table I) that there are no patients with "pattern D" (anti-Centromere) most likely due to their limited (117) number of patient samples; however, the data in table I was not used as a comparison or statistical analysis with an "unknown" patient sample to determine whether that patient sample might somehow be associated with no diseases and/or SLE and possibly other diseases.

Thus, whether or not it is obvious to one skilled in the art to combine Thompson with Kim and/or Diamond, doing so still would not result in the present invention since neither Kim nor Diamond make up for the deficiencies of Thompson. In particular, Neither Kim nor Diamond teach storing, and using, reference data sets "having values representing levels for each of a plurality of autoantibodies, wherein said reference data sets include, for each of said

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plurality of specific SADs, at least one reference data set for the specific SAD ..." as is recited in claims 1 and 18 (emphasis added).
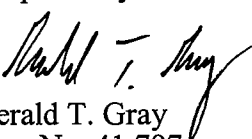
Accordingly, it is respectfully asserted that independent claims 1 and 18 are patentably distinct from Thompson, Kim and Diamond as alleged in the Office Action for at least the above reasoning. Further, all claims depending from claims 1 and 18 are also patentable over the cited references based at least on their dependency from allowable claims 1 and 18. Additional reasons for allowability of the dependent claims will not now be presented as these claims inherit allowability from their base claims.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 925-472-5000.

Respectfully submitted,

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